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ABSTRACT

The "Habitat" learning system was designed by TVOntario's Children's Programming department for junior-level students. It consists of 20 programs (each 15 minutes long), a teacher's guide, and a magazine for students. Three major objectives of the series were to (1) instruct children in scientific principles relating to habitats; (2) make children aware of what scientists do; and (3) encourage children to take an interactive role with animals. This report examines the educational effectiveness of the learning system, ascertains the acceptability of the thematic approach and its potential application, and examines the use and implementation of the system in the classroom. Data were collected from focus groups and field testing groups. Both focus group and field test group teachers approved the learning system as a whole. Teachers' reactions on strengths and weaknesses, teaching strategy, and print materials of the program are reported. Students were administered pre- and post-tests containing questions about demographic characteristics, attitudes toward science and scientists, and knowledge of science. The "Habitat" Learning System did not change students' attitudes toward science. Students did learn about animals and their habits, and were interested in the new information on animals. Recommendations for the learning system, the programs, the printed materials, and further research are suggested. Summaries of this document in both English and French are included. (YP)

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Summative Evaluation of the

Habitat

Learning System

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July 1989

Report No. 3 – 1989-90

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TVOntario

Office of Project Research
Service de recherche et d'évaluation

Abstract 3–1989-90

Summative Evaluation of the *Habitat* Learning System

Prepared by: Robert Stewart Brown, Research Officer

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Tim Mischuk, Research Coordinator

(TVOntario, Evaluation and Project Research, Report No. 3 — 1989-90, 46 pp.)

The *Habitat* learning system was designed by TVOntario's Children's Programming department for junior-level students. Three major objectives of the series were to instruct children in scientific principles relating to habitats; to make children aware of what scientists do; and to encourage children to take an interactive role with animals. The system consisted of 20 programs (each 15 minutes long), a teacher's guide, and a magazine for students. It was a departure from most learning systems: the guide was organized by theme, while the programs were presented in a magazine format. It was thought that the teacher would use the teacher's guide to engage in theme-related activities, and then use a VCR to locate topics on the theme, in as many as 11 programs.

Evaluation and Project Research undertook an evaluation to examine the educational effectiveness of the learning system; ascertain the acceptability of the "thematic" approach, and its potential application; and examine the utilization and implementation of the system in the classroom. The evaluation had two components. (1) Two focus groups of science teachers (N=12) were sent a copy of the guide and magazine, and tested with two representative programs a week later. (2) Eighteen junior-level classes in six boards of education throughout the province were selected for a field test. Teachers used the learning system for around three months in the spring of 1988. A pre-test was administered to students (N=460) at the beginning of the evaluation, and a post-test at its conclusion; representative subgroups from each class participated in focus group discussion. Teachers (N=18) completed a questionnaire on their experiences with *Habitat*.

1. Teachers

Both focus group and field test teachers came up with similar results, which is striking because of the difference in method. Both approved of the learning system as a whole. They thought it suitable for junior-level students, and a minority also thought it suitable for grade 3 and grade 7. They had high opinions of the programs, which were thought useful in class, interesting, motivating, and easy to integrate into classroom teaching. The photography was thought especially impressive. Criticism focused not on the artistry of the shows, but on how to use them. The most serious flaw was thought to be the number of unrelated short topics put into each program. Successful use depended upon video technology: teachers would select segments on one theme from different programs. However, teachers felt this was extremely inconvenient: it took a great deal of time to locate segments, and their brevity (three-four minutes or less) would dissuade teachers from making the effort. Teachers *preferred* to use programs thematically, but all field testers who did this ran into trouble, because of the effort needed to locate segments. A review of available literature indicates that teachers of *Habitat* are probably typical in being intimidated by VCR setup time and logistics.

Teachers gave favorable ratings to the longer segments, ambivalent ratings to the short segments and legends, and somewhat negative ratings to the photo album segments.
Several participants also criticized the change from photography to the story board "legend" segments.

Use of the print material was fairly widespread. Teachers found the material was useful in class, interesting, easy to follow, motivating, and easy to integrate into the classroom, although some thought there should have been more activities or suggestions. They had trouble coordinating the program segments using VCRs, as had been recommended. But this did not appear to be overly detrimental, because teachers went to the guide and manual to pick and choose from what material was offered, rather than using the guide to organize class lessons. Other EPR evaluations have indicated that teachers took to print material as support for the video — to assist the teacher with program background, and to suggest student activities. The *Habitat* print material had these characteristics and so was favorably judged.

2. Students

Participating students liked *Habitat*; in the post-test, a quarter said they liked it more than anything else in their science class. They especially appreciated the characteristics and habits of animals as presented in the programs, and were stimulated by the variety and amount of new information on animals. There was no one problem that stood out. The most numerous complaint was about the quantity of notes that had to be taken during and after the programs, since at the junior level students have just started assignments, and they may not yet be comfortable with the work involved. They also complained about the fast pace or short length of some program segments.

Habitat does not appear to have demonstrably changed the attitudes of students to science: they liked science and scientists before the evaluation, and they continued to like them after the evaluation. During their school year, most students had watched at least a few science programs and read a few books or magazines on science; *Habitat* does not seem to have had a noticeable effect on this. However, they picked up information about animals and their habits during the time they used the learning system. There were four sections in the pre- and post-tests that looked at the acquisition of knowledge about animals, and students did better in three of the four. They appear to have gained knowledge of a more concrete nature, which is to be expected because the capacity for abstract analysis is underdeveloped at the junior level.

Among the suggestions and recommendations were the following:

- The *Habitat* learning system appears to have been well received. Teachers and students appreciate the quality of the photography and information about animals, and found the print material quite useful. Students probably learned at least some specific information about animals and habitats.

- Students already had very favorable attitudes to science and scientists, and the programs could not affect them. It might be useful to ascertain if and how attitudes change to science as children grow older.

- Teachers thought the thematic approach to using television was most effective, but had trouble using it with *Habitat*. Future learning systems should be designed to facilitate classroom use with a minimum of setup. If a thematic approach is used, these themes should be put together in such a manner that the teacher does not have to devote much time to operating the VCR.

- Producers of future programs for school use might wish to construct segments between 4 and 15 minutes.

- Short exercises and activities that can be easily used in the classroom, and easily modified, appear to be especially successful. The *Habitat* print material had these, and was highly regarded by teachers.

- It would be very useful to examine the distribution procedure of print and video, to see what materials are actually being used in the schools. Decisions to change or modify learning systems should be based on such market information.

- The most important criticism of the learning system — problems in using the VCR to locate program segments — would have been easily noticed in a formative evaluation. This shows the importance of communicating with teachers before and during the development of learning systems.

TVOntario

Office of Project Research
Service de recherche et d'évaluation

Abrégé n° 3–1989-90

HABITAT:
Summative Evaluation of the Learning Series

préparée par Robert Stewart Brown, agent de recherche
avec la collaboration de Dianne Davis, agente de recherche
et Tim Mischuk, coordonnateur de recherche

(TVOntario, Service de recherche et d'évaluation, rapport n° 3–1989-90, 46 pp.)

Le système d'apprentissage *Habitat* a été conçu par le Secteur enfance du Service de la programmation anglaise de TVOntario à l'intention des élèves du primaire. La série visait trois objectifs principaux : transmettre aux élèves des notions scientifiques sur l'habitat des animaux, leur faire apprécier le travail des chercheurs et les inciter à jouer un rôle interactif vis-à-vis de la vie animale. Le système comprend 20 émissions de 15 minutes chacune, un manuel de l'enseignant et un magazine pour les élèves. Il se démarque de la plupart des autres programmes en ce que le manuel est structuré par thèmes, tandis que les émissions sont présentées dans un format magazine. On s'attendait à ce que le manuel permette aux enseignants de faire des activités par thème pour ensuite repérer les sujets à l'aide du magnétoscope parmi plus de 11 émissions.

Le Service de recherche et d'évaluation a entrepris une évaluation pour mesurer l'efficacité pédagogique du système d'apprentissage, pour examiner l'utilité de la démarche thématique et de ses applications éventuelles, et pour examiner l'utilisation et la mise en application du système en classe. L'évaluation comportait deux volets : (1) on a fait parvenir à deux groupes choisis de professeurs de sciences (N=12) un exemplaire du manuel et du magazine et, une semaine après, on a fait des groupes de discussion avec eux, suite à la présentation de 2 émissions de la série ; (2) on a choisi dix-huit classes du cycle primaire, dans six conseils scolaires de la province, pour un essai pratique. Les enseignants ont utilisé le système pendant trois mois environ, au printemps de 1988. On a administré aux élèves (N=460) un test préliminaire au début de l'évaluation et un test final ; des sous-groupes, formés d'un certain nombre d'élèves de chaque classe, ont participé à des discussions. Les enseignants (N=18) ont enfin rempli un questionnaire sur leur expérience de l'utilisation d'*Habitat*.

1. Enseignants

Les enseignants dans les groupes de discussion et ceux qui ont subi l'essai pratique ont produit des résultats analogues, ce qui est étonnant à cause de la différence des méthodologies utilisée. Les deux ont approuvé le système dans son ensemble. Ils l'estiment adapté aux élèves de ce niveau et quelques-uns pensent même qu'il convient aux élèves de 3ième à 7ième année. Ils ont jugé très positivement les émissions qu'ils trouvent utiles, intéressantes, stimulantes et faciles à intégrer dans leur enseignement quotidien. Ils ont été très impressionnés par la qualité de la photographie. Les critiques exprimées ne portaient pas sur la présentation artistique des émissions, mais plutôt sur leur mode d'utilisation. La faiblesse la plus grave semblait être le nombre de courts sujets épars qui sont présentés dans chaque émission. Le succès dépendait des techniques d'emploi de la vidéo : les enseignants choisissaient, dans les diverses émissions, les séquences se rapportant à un même sujet. Ils considéraient cependant cela très fastidieux : il faut beaucoup de temps pour repérer les séquences, et leur brièveté (trois ou quatre minutes au maximum) décourage un tel effort. Les enseignants préféraient l'approche thématique, mais tous ceux qui l'avaient utilisée lors des essais pratiques ont éprouvé de réelles difficultés à cause de l'effort que le repérage des séquences demandait. Une revue de la documentation disponible sur ce sujet indique que les enseignants d'*Habitat* ne font pas exception lorsqu'ils sont intimidés par la complexité des ajustements et de la logistique des magnétoscopes.

Les enseignants ont jugé favorablement les séquences plus longues, étaient partagés sur la cote à donner aux séquences courtes et aux légendes et, dans quelques cas, ont exprimé des opinions négatives sur certaines parties de l'album photographique. Plusieurs participants ont également critiqué le passage de la photographie au scénario-maquette avec légende.

La documentation imprimée a été assez largement utilisée et les enseignants l'ont trouvé utile, facile à suivre, motivante et simple à intégrer au travail en classe, bien que certains auraient aimé un peu plus d'activités ou de suggestions. Ils ont éprouvé des difficultés à coordonner les séquences d'émissions à l'aide du magnétoscope selon les recommandations reçues. Mais cela n'a pas été un obstacle insurmontable car les enseignants ont choisi dans les manuels le matériel qui s'y trouvait plutôt que de se servir du manuel pour structurer leurs leçons. D'autres évaluations ont mis en évidence que les enseignants utilisaient le matériel imprimé comme soutien à la vidéo, pour mieux situer le contexte et suggérer des activités. Les documents d'*Habitat* possédaient ces caractéristiques et c'est pourquoi ils ont été appréciés.

2. Élèves

Les élèves ont aimé *Habitat* ; lors du test final, un quart d'entre eux ont affirmé qu'ils le préféraient à tout autre sujet traité dans la classe de science. Ils ont apprécié tout particulièrement les caractéristiques et les comportements des animaux, ainsi que la variété et la quantité d'informations présentées. Ils n'ont signalé aucune difficulté majeure mais se sont plaints de l'abondance de notes qu'ils devaient prendre pendant le cours et après la projection : en effet, à ce niveau, ils commencent à peine à rédiger des travaux et ils ne sont pas encore sûrs du travail à faire. Ils ont regretté aussi la vitesse ou la brièveté de certains passages.

Habitat ne semble pas avoir modifié sensiblement les attitudes des élèves à l'égard des sciences : ils aimaient la science et les hommes de science avant l'évaluation et ils les aimaient tout autant après. Pendant l'année scolaire, la plupart des élèves avaient regardé au moins quelques émissions des sciences et lu des livres ou des revues scientifiques ; *Habitat* n'a donc pas eu d'influence marquée. Toutefois, le système d'apprentissage leur a donné l'occasion d'enrichir leur bagage de connaissances sur les animaux. Le questionnaire auquel ils ont répondu contenait quatre sections destinées à vérifier l'acquisition de connaissances sur la vie animale et, dans trois de ces sections, les élèves ont fait des progrès. Leurs connaissances étaient devenues plus concrètes, ce qui était à prévoir puisque la disposition à l'analyse abstraite n'est pas encore de leur âge.

Voici des recommandations et des suggestions faites à la suite de l'étude :

- Le système d'apprentissage *Habitat* semble avoir été accueilli favorablement. Les enseignants et les élèves apprécient la qualité de la photographie et les informations sur les animaux et ils ont trouvé les documents imprimés très utiles. Selon toute probabilité, le programme a contribué à donner aux élèves des notions précises concernant les animaux et leur habitat.

- Les élèves montraient déjà une attitude favorable envers la science et les chercheurs et le programme n'a pu que la conforter. Il pourrait néanmoins être utile de voir si les élèves changent d'attitude envers la science en vieillissant et comment ce changement se produit.

- Les enseignants ont exprimé l'avis que l'approche thématique convenait le mieux aux émissions éducatives, mais ils ont éprouvé des difficultés avec *Habitat*. À l'avenir, les systèmes d'apprentissage devraient limiter au maximum les manipulations du magnétoscope en classe. Si l'on poursuit la démarche thématique, les sujets devraient être montés de façon à ce que l'enseignant ne doive pas passer trop de temps à manipuler le magnétoscope.

- Les producteurs d'émissions scolaires devraient songer à un découpage en séquences d'une durée variant entre 4 et 15 minutes.

- Les exercices et activités courts, faciles à utiliser en classe et faciles à modifier semblent particulièrement appréciés. Les manuels d'*Habitat* avaient ces caractéristiques et, pour cette raison, les enseignants en ont eu une opinion tout particulièrement favorable.

- Il serait très utile de revoir les méthodes de distribution des documents vidéo et des documents d'accompagnement pour savoir jusqu'à quel point ils sont réellement utilisés dans les écoles. La décision de modifier les programmes devrait se fonder sur les données relatives au marché.

- Une évaluation formative aurait permis de faire ressortir facilement les difficultés liées au maniement du magnétoscope et au repérage des séquences recherchées, critique la plus importante du système d'apprentissage. Cela démontre l'importance de communiquer avec des enseignants avant et pendant l'élaboration de systèmes d'apprentissage.

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INTRODUCTION

BACKGROUND

Habitat is a learning system designed by TVOntario's Children's Programming department. It is targeted for junior-level students, although elements may be used with both primary and intermediate levels. Three major objectives of the series are:

— to instruct children in scientific principles related to habitats, e.g., adaptation, the role of humans in the animal kingdom, and care of the environment

— to make children aware of scientists, their roles and activities — what they do

— to encourage children to take an interactive role with animals, e.g., in taking care of pets, environmental issues

The system had a television component, a teacher's guide, and a magazine for students.

LEARNING STRATEGIES

Utilization of the system was perceived as involving two possible learning strategies.

1. The programs could be used as a video library — as a resource on science, to which teachers and students can go for research and enjoyment. Videocassettes of *Habitat* programs could therefore be used like "nature books, magazines, and reference works." This is similar to the "video library" approach used for the Youth department's *Business Concepts* series.

2. The system could be used in "thematic" teaching of science. The approach used in *Habitat* posited that teachers will be more interested in looking at themes that can be discussed over several programs: for example, looking at grasslands habitats, which are scattered across several programs. The teacher, in consultation with the teacher's guide, would engage in activities and look at topics that involve locating segments from as many as 11 programs. Teachers (and students) have a greater control over the organization of instruction.

   This approach is conceived to be somewhat different from the "linear" approach of many learning systems. In a linear system, instruction is provided through a structured, step-by-step organization. Program 1 would be shown, and learning activities related to that program would be initiated; then Program 2 would be shown, and so on.

The rationale behind this thematic strategy was that:

— Since it is thought that educators teach thematically, the *Habitat* series and activities were more closely related to their needs.

— A thematic approach facilitates the applicability of the learning system to a wider range of topics and teaching styles. This is additionally important in light of the ministry curriculum guide on junior science, which recommends linking science with the other elements of the junior curriculum.

SYSTEM COMPONENTS

1. The Video Component

There were 20 *Habitat* programs of approximately 15 minutes' duration. Each program used a magazine format to present:

— three main items (a different animal or habitat in each item)

— a number of shorter segments (e.g., a 34-second short on the sand grouse in program 2)

— a photo album sequence showing "some aspect of the relationship between children and animals"

— a legend about some of the animals featured in the series

2. The Teacher's Guide

The teacher's guide was organized by theme, rather than by program. It had two main sections:

— an overview of concepts relating to habitats, such as the classification of animals

— activities concerned with specific types of habitats, like mountain habitats and ocean habitats

Student activities were varied and included a trivia game along the lines of Trivial Pursuit, and a questionnaire for students to demonstrate misconceptions about animals.

Because teachers and students were encouraged to look at program segments, the guide had information to facilitate using VCRs with the learning system. This included a four-page insert in the middle of the guide, with instructions for locating different program segments, and a chart allowing teachers to put down the counter numbers for each segment.

The guide also contained suggestions for using the learning system with language arts and creative arts.

3. The Magazine

The magazine for students contained a number of short articles written by scientists and zoo officials who were featured in the programs. For example, one article told how the Toronto zoo built living quarters for animals to resemble the animals' native habitat, but with the requirements of the zoo in mind. Another article advised its readers on buying fish for their home aquariums.

OBJECTIVES

Evaluation and Project Research was requested to undertake an evaluation of the learning system, with the following objectives:

1. Examine the educational effectiveness of the learning system.

   - Are the main objectives of the series met (an increased interest in science; learning of cognitive information about science and scientific principles; learning of affective information about animals and the environment)?
   - What are the strengths and weaknesses of the system components (the programs, teachers guide/activities, student magazine)?

2. Ascertain the acceptability of the thematic approach, and its potential application to other learning systems.

3. Examine the utilization/implementation of the system in the classroom.

   - How is the system used?
   - How does it fit into the curriculum?
   - What are teacher attitudes to, and experiences with, VCR technology in the classroom?

METHOD

Teacher Focus Groups

Participating teachers (N=12) were sent a copy of the *Habitat* teacher's guide and magazine. One week after receiving this material, teachers were shown two representative *Habitat* programs; answered a questionnaire on the programs; and participated in focus group discussion with an EPR research officer. Two sessions were held at elementary schools in Metropolitan Toronto.

Field Testing

Six boards of education were selected: three with primarily urban schools (including one in Metropolitan Toronto), and three boards of education with primarily rural schools. Working with board officials, the research coordinator selected one grade 4, one grade 5, and one grade 6 class from each board. There was a total of 18 classes.

Each participating teacher was sent:

- the *Habitat* programs (20 programs of 15 minutes' duration)
- a teacher's guide
- three copies of the student magazine
- a short explanation of the learning system, along with utilization suggestions (see Appendix 1)

Teachers were given three months to use the materials in the spring of 1988. At the beginning of the test period, a short pre-test was administered to students. The test had questions about student attitudes to science and scientists, along with a number of multiple-choice questions on knowledge of science.

At the end of the test period, participating teachers completed a questionnaire on their use of the material and their comments on it. Researchers went to each class, and administered a post-test to all students. In addition, they engaged in focus group discussion with a subsample of students. This discussion was recorded on audiotape and sent back to TVOntario for transcription.

All teachers and classes completed the evaluation. There was a total of:

— 18 teacher questionnaires

— 460 matched student pre-tests and post-tests

— 18 student focus group transcripts

FINDINGS

TEACHERS

Teachers' Focus Group

One week before the sessions, participating teachers were sent a copy of the *Habitat* teacher's guide and magazine. During the focus group, teachers were shown two representative programs (programs 4 and 13), and answered a questionnaire on the programs, the print material, and the learning system as a whole.

There were two sessions in Metropolitan Toronto. Twelve teachers of junior-level students answered the questionnaire, and participated in focus group discussion. Three-quarters had taught science since September 1987. Sixty percent were female; three-quarters had over 15 years of teaching experience.

Appeal of the Learning System

Eight of the 12 teachers had viewed the programs and read the print material; these teachers rated the system on a scale of 1 to 5, where 1 was "inferior" and 5 was "excellent." The system was given moderate approval, with an average of 3.4:

Inferior	1	2	3	4	5	Excellent
Percentage of teachers:	—	**12.5**	**37.5**	**50.0**	—	

Appeal of Programs and Program Segments

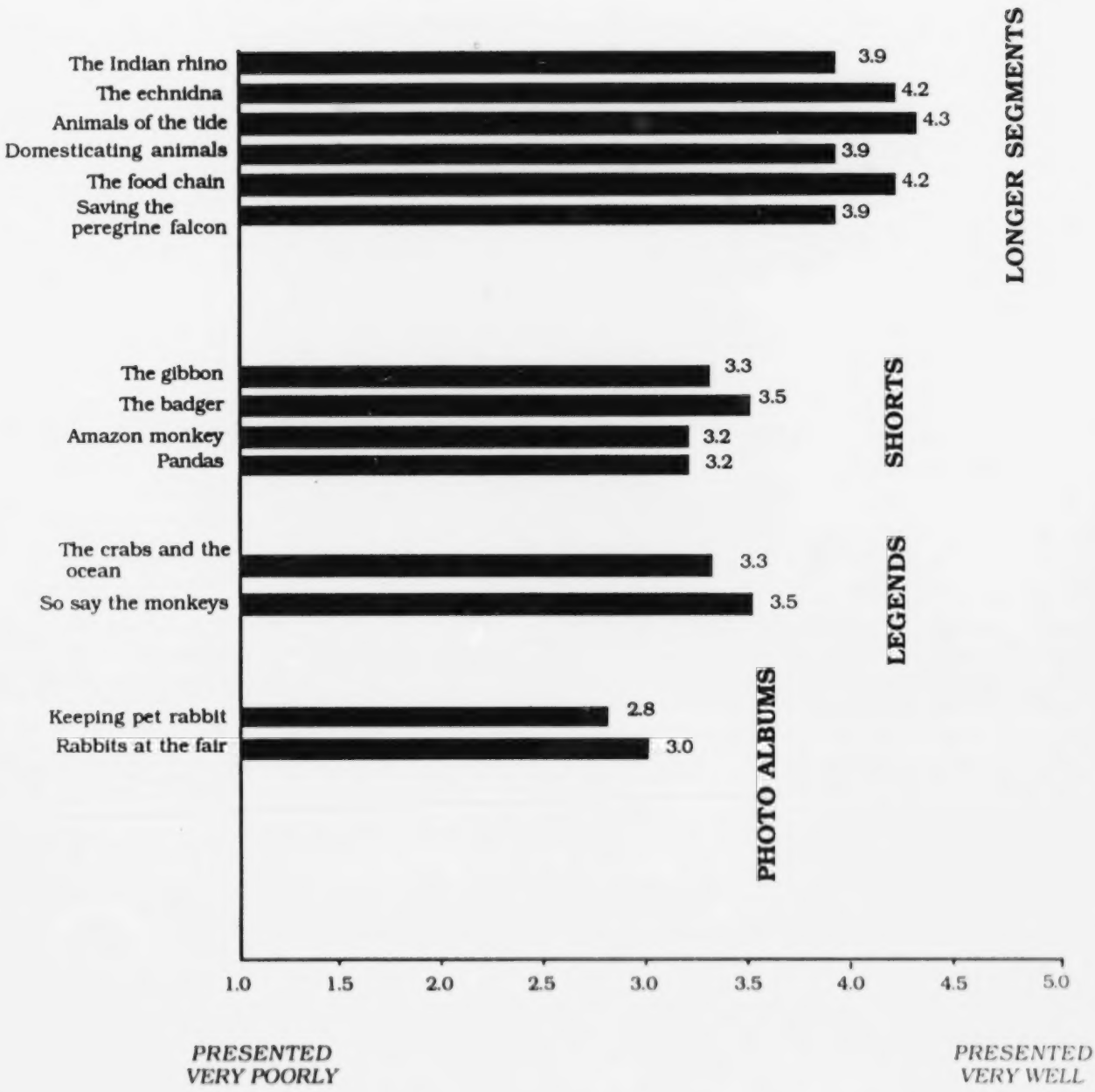
Teachers quite clearly liked the programs. On a scale of 1 to 5, where 1 was "not at all appealing" and 5 was "very appealing," they gave program 4 a mean rating of 4.3 and program 13 a mean rating of 4.2. They thought their students would like the programs: on a 1 to 5 ranking of appeal to the students, they gave program 4 a rating of 4.3 and program 13 a rating of 4.5.

Teachers were also asked to rate the program segments on a scale where 1 meant the segment was presented "very poorly" and 5 meant the segment was presented "very well." Most believed the longer segments were well presented, but were ambivalent about the shorter items. Of 14 program segments in the two programs:

- the longer "main" segments received the highest scores — averaging between 3.9 and 4.3
- shorts and legends were given ambivalent scores of between 3.2 and 3.5
- the two photo album segments were scored lowest (3.0 and 2.8)

See Figure 1 for a complete listing of ratings.

Figure 1:
Mean Scores of Program Segments
Teacher Focus Group



Respondents were asked to describe the programs by rating them on a set of descriptive scales (see Table 1). Most thought the programs would be useful in class, interesting, motivating, and easy to integrate into classroom teaching. There was uneasiness about the pace and organization: 42 percent did not think the programs were easy to follow; a majority (58 percent) thought the programs were too fast.

Table 1

Reaction to Descriptive Adjectives: Teacher Focus Group Television Programs

not useful in class	1	2	3	4	5	useful in class
Percentage of teachers: Mean = 4.3	—	—	8.3	50.0	33.3	
boring	1	2	3	4	5	interesting
Percentage of teachers: Mean = 4.4	—	—	8.3	41.7	50.0	
difficult to follow	1	2	3	4	5	easy to follow
Percentage of teachers: Mean = 3.6	8.3	8.8	25.0	33.3	25.0	
uninspiring	1	2	3	4	5	motivating
Percentage of teachers: Mean = 4.1	—	8.3	16.7	25.0	50.0	
difficult to integrate into classroom teaching	1	2	3	4	5	easy to integrate into classroom teaching
Percentage of teachers: Mean = 4.1	—	—	33.3	33.3	33.3	
too slow	1	2	3	4	5	too fast
Percentage of teachers: Mean = 3.5	—	8.3	33.3	50.0	8.3	
too short	1	2	3	4	5	too long
Percentage of teachers: Mean = 2.5	16.7	25.0	50.0	8.3	—	
too little information	1	2	3	4	5	too much information
Percentage of teachers: Mean = 2.8	16.7	8.3	58.3	8.3	8.3	

Note: Totals may not add up to 100 percent because of missing values.

Strengths and Weaknesses of the Programs

The teachers were asked to give their opinions on the strengths and weaknesses of the programs, in focus group discussions and in open-ended questions. The series' photography was particularly praised.

> "I enjoyed the graphic illustrations."
>
> "(The programs had) good photography — the pictures would appeal to kids."

The most frequently mentioned flaw was thought to be the number of unrelated short topics put into each program. The theory behind this organization was that teachers and students would be able to select thematically related program segments using videocassette technology. They would engage in activities and look at topics that involve locating segments from as many as 11 programs. This was supposed to provide a greater control over the organization of the instruction.[1]

However, in questionnaires and focus groups, teachers commented that this would be difficult because of hardware and time limitations. Further, even if teachers were able to select program segments, the brevity of these segments (three-four minutes for longer ones, less than a minute for shorts) would dissuade them from making an effort.

> "We have to follow a program of study. We're looking for things that will help us to present that particular program of study. We're not looking for hours and hours of more work...if you are dealing with deserts, then let's have something that deals with deserts, that will take some time and go into depth, rather than jumping around in 1 1/2-minute segments here, a two-minute segment there."
>
> "I would do the same thing as (another teacher) was saying, where you would take out the various segments to try to group them together on your own. But the time involved to that doesn't warrant what you get in the end result....There's things that I've never seen before, so obviously the children would not have. You know, I've enjoyed it, so the children would enjoy it. But to use it as a teaching tool — there has to be a complete reorganization of it."
>
> "The short parts [segments] could be easily missed by an inattentive student, and I am concerned about the quality and organization of the material.
> The information contained in the two programs I viewed does not seem together, and would not be the way I would organize the material for teaching and ease of understanding."

There were also criticisms of the abrupt format change from video photography to the animation story boards of the "legends" segments, although teachers appreciated the importance of the legends for integration with other subjects.

> "To go from realism to a cartoon type presentation — there is an attitude change. One becomes a real-life situation and one becomes (*interjection by other teacher:* "A thing.") A cartoon is meaningless as far as I'm concerned. I'm a science teacher, and I take all of this to heart."

---

[1] See the Habitat Research Proposal, p. 2.

> "The thing that bothered me about the legends — some of the grade 4s would be into the legend before they realized what it was all about. I could see my children saying — what is this? Up to now we've been getting information about animals. Now all of a sudden we've got animation. If there had been some little break or some little title.... I could see my children sitting there, wondering what we're doing now. (*Query: because it was a format change*?) It's totally different. I don't think they'd realize that they were into a legend or a fairy tale or anything totally different from what they've been doing."

The Programs: Teaching Strategy

Teachers were asked to indicate what strategy they would prefer in using the programs in class. (They were given four possible choices and an option for writing in their own preferred strategy.) Of the 10 who answered this question, all said their preferred strategy would be "using program segments on related themes." Looking at this finding in light of criticisms of the programs' organization (see above), this may indicate that teachers would prefer to use program segments on related themes, but dislike the large number of short segments found in the *Habitat* programs.

Six teachers also said that a (second) preferred strategy would be using the programs as a "video library."

Reaction to the Print Material

Eight of the 12 participating teachers had given at least cursory attention to the print material. Most had favorable opinions of the teacher's guide and magazine: they thought the material was useful in class, interesting, easy to follow, motivating, and easy to integrate into classroom teaching, with the right length and right amount of information.

A few negative comments were given:

- A few teachers thought the color of the magazine (olive green) was too monotonous and would "turn students off"
- It was also thought that teachers would have to provide a copy of the magazine to each student, or would have to photocopy relevant portions of the magazine for each student.
- One teacher said that the guide and/or magazine should contain lists of facts related to the themes being discussed (e.g., deserts), which would serve as a "take-off" for student research

Suitability of the Learning System to the Junior Level

The learning system was designed for the junior level (grades 4-6), and teachers thought it appropriate for that target. When they were asked what grade or grades they thought *Habitat* best suited for, grades 4-6 were by far the top choices. (See Table 2)

Table 2: Most Suitable Grades for *Habitat*

"For what grade or grades would you consider *Habitat* best suited? Circle up to three choices."

	(N=12) %
Grade 1	—
Grade 2	—
Grade 3	16.7
Grade 4	**66.7**
Grade 5	**75.0**
Grade 6	**75.0**
Grade 7	8.3
Grade 8	—
Grade 9	—
Did not answer	16.7

Note: Totals exceed 100 percent because respondents could give more than one answer.

Three-quarters believed *Habitat* would fit into the junior-level curriculum "very well," while 83 percent thought junior-level students would be able to understand most of the information. Eighty-three percent (10 of 12 teachers) said they would consider using the system with their students. Two did not answer (they had not read the print material and so probably did not feel qualified to answer a question about the system as a whole).

Field-Testing Teachers

Teachers in six boards of education from across the province (N=18) used the learning system with their students for a period of between two and three months. At the end of that period, these field testers completed a questionnaire about their experiences with *Habitat*.

Appeal of the Learning System

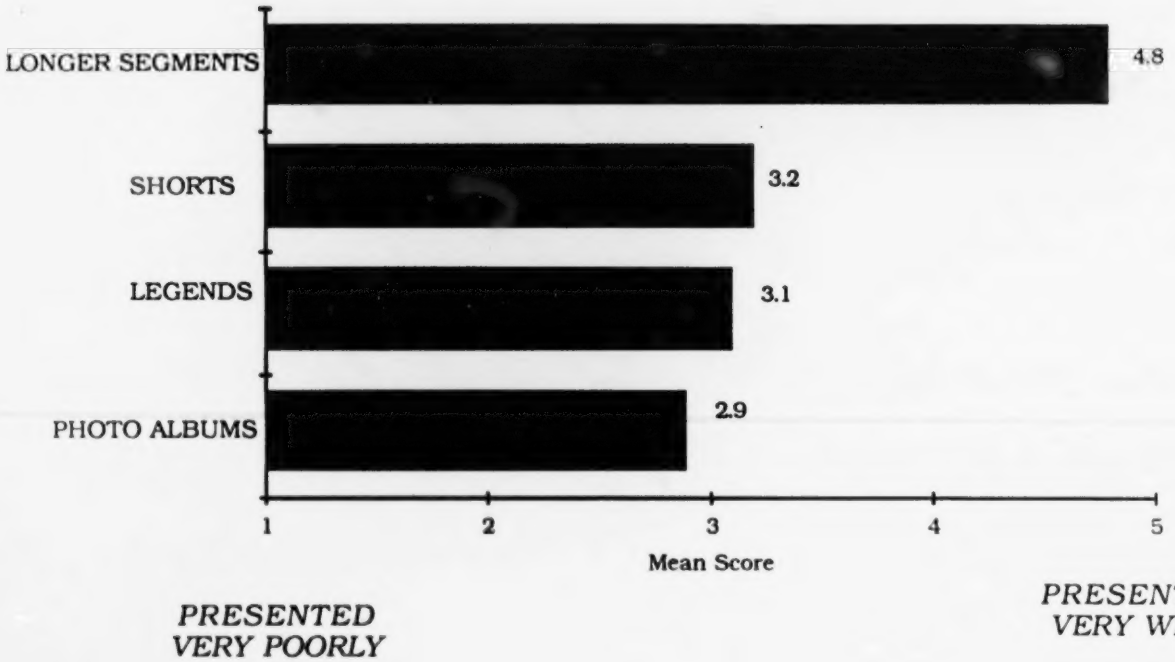
As in the focus group, testers rated the learning system on a scale of 1 to 5, where 1 was "inferior" and 5 was "excellent." Most (83 percent) gave the learning system a favorable rating, with a mean score of 4.2.

Inferior	1	2	3	4	5	Excellent
Percentage of teachers:		—	**5.6**	**11.1**	**44.4**	**38.9**

Appeal of Programs and Program Segments

Participants rated the types of segments found in the programs. A scale was used on which 1 meant the segments were not at all useful to class, and 5 meant the segments were very useful to the class. Findings here are virtually identical to those in the focus group: longer "main" segments were highest ranked; shorts and legends were ambivalently ranked; the "photo album" segments were lowest ranked (see Figure 2).

Figure 2:
Mean Scores of Program Segments
Field Testers



Field testers approved, for the most part, of the programs as a whole: they thought the programs useful in class, interesting, and motivating. A m[illegible]ity also thought the programs easy to follow, with the right pace, the right length, and the right amount of information — although there were a few who disagreed with this. For more details, see Table 3 below.

Table 3
Reaction to Descriptive Adjectives: Field Testers
Television Programs

not useful in class	1	2	3	4	5	useful in class
Percentage of teachers:	—	—	**11.1**	**50.0**	**38.9**	
Mean= 4.3						
boring	1	2	3	4	5	interesting
Percentage of teachers:	—	—	—	**33.3**	**66.7**	
Mean= 4.7						
difficult to follow	1	2	3	4	5	easy to follow
Percentage of teachers:	—	**5.6**	**33.3**	**27.8**	**33.3**	
Mean= 3.9						
uninspiring	1	2	3	4	5	motivating
Percentage of teachers:	—	—	**11.1**	**27.8**	**61.1**	
Mean= 4.5						
difficult to integrate into classroom teaching	1	2	3	4	5	easy to integrate into classroom teaching
Percentage of teachers:	**16.7**	**5.6**	**11.1**	**27.8**	**38.9**	
Mean= 4.1						
too slow	1	2	3	4	5	too fast
Percentage of teachers:	—	—	**61.1**	**27.8**	**5.6**	
Mean= 3.7						
too short	1	2	3	4	5	too long
Percentage of teachers:	**5.6**	**16.7**	**72.2**	—	—	
Mean= 2.7						
too little information	1	2	3	4	5	too much information
Percentage of teachers:	—	**5.6**	**55.6**	**33.3**	—	
Mean= 3.3						

Note: Totals may not add up to 100 percent because of missing values.

Program Format

Testers were asked about a few specifics of program format:

— *All* liked the photography in the programs.
— *Most* thought the background music added to the programs.
— *A majority* agreed that the questions at the beginning of the programs were very effective.

Table 4: Program Format

	Disagree strongly				Agree strongly
I liked the photography in the programs	1	2	3	4	5
Percentage of teachers: Mean= 4.9	—	—	—	5.6	94.4
I thought the background music added to the programs	1	2	3	4	5
Percentage of teachers: Mean= 4.1	5.6	11.1	5.6	27.8	50.0
The questions at the beginning of the programs were very effective	1	2	3	4	5
Percentage of teachers: Mean= 4.9	—	22.2	16.7	16.7	38.9

Note: Totals may not add up to 100 percent because of missing values.

Strengths and Weaknesses of the Programs

Field testers thought the program strengths were: their visual impressiveness and photography (39 percent); their entertainment value for children (39 percent); and the quality of the information or facts (33 percent).

> "The visual aspect — made it a real-life situation the students could relate to."
>
> "Excellent photography — closeups of animal behavior is main strength."
>
> "The program introduces students to a whole variety of species in an entertaining manner. It made our Habitat Destruction unit real for the children."
>
> "Provided visual and verbal information, which stimulated interest, discussion, and research."

For a complete list, see Table 5.

Table 5: Program Strengths

	% (N=18)
Entertaining/interesting to children	38.9
Visually impressive/the photography	38.9
The information/facts	33.3
ReaL life – makes it real	16.7
Variety of material presented	11.1
Other	11.1

Note: Totals may exceed 100 percent because respondents could give more than one answer.

As mentioned earlier, the programs had been organized so that teachers could locate segments on one theme (e.g., "Tropical rain forests") from several programs, using videocassette technology. However, field testers (like teachers from the focus group) considered this the major weakness of the programs — half the sample disliked the "excessive" use of VCRs and the constant switching of tapes. In addition, a fifth of the sample (4 of 18) thought that thematic segments should be on one tape — that all the desert segments should be on one tape, all the rain forest segments on another tape, and so on.

> "There was no flow of programming on the tapes — I spent too much time inserting and forwarding tapes."
>
> "Seemed too chopped up, 'bouncing' from one habitat to another — (it is) difficult to line up seven or eight segments regarding one habitat specifically."
>
> "Setup of programs for classroom use (was the greatest weakness). I understand the setup as these were originally designed for TV use and not necessarily for the classroom. However, the students seemed to find it distracting to continuously be exchanging tapes in order to cover one habitat area. Also, having two programs on one tape meant that in certain habitat groups it was not always possible to line up all the recommended program sections beforehand and some were consequently left out. Time required to line up the program segments beforehand is also sometimes a little lengthy. Students' comments indicated that they felt it might have been better to have all program segments dealing with one habitat area on one tape — that way, pauses for discussion could be integrated and all program segments could be seen."
>
> "All programs concerning a particular habitat must be on one tape, *not* on several different ones. Students lose interest when changing tapes."

For a complete list of frequencies, see Table 6.

Table 6: Program Weaknesses

	% (N=18)
Using VCRs/switching tapes	50.0
Thematic segments should be on one tape	22.2
Misc. format problems	16.7
Other	11.1
No problems/no comment	11.1

Note: Totals may exceed 100 percent because respondents could give more than one answer.

The Programs: Teaching Strategy

The teacher's guide had suggested several ways to use the television programs, although "using programs on related themes" was emphasized. Field testers were given complete freedom on what approach to use. Half the sample showed program segments on related themes; over a quarater showed all 20 of the programs in sequential order. One-third used multiple strategies (including four who showed all the programs in sequence, and also showed programs on related themes).

Table 7: Teaching Strategy

"The teacher's guide suggests several ways to use the television programs. Which of the following strategies, if any, did you use in the classroom?"

	% (N=18)
Using program segments on related themes only	50.0
Showing all the programs in sequence, from program 1 to program 20	27.8
Multiple strategy (e.g., using program segments on related themes, then showing all the programs in sequence)	33.3
Using the programs as a video library	11.1
Showing selected programs in their entirety	5.6
Another strategy	5.6

Note: Totals may exceed 100 percent because respondents could give more than one answer.

Reaction to the Print Material

All field testers read the teacher's guide, and all but one used suggested activities or exercises. Two-thirds read the student magazine, and half used magazine activities or exercises. Field tester reaction to the material was, on the whole, quite favorable: testers usually thought the material was motivating, easy to integrate into classroom teaching, the right length, and had the right amount of information. The teacher's guide was, in most cases, more highly regarded than the student magazine (see tables 8 and 9).

Table 8: Reaction to Descriptive Adjectives: Teacher's Guide (N=18)

not useful in class	1	2	3	4	5	useful in class
Percentage of teachers: Mean= 4.2	5.6	—	22.2	16.7	55.6	
boring	1	2	3	4	5	interesting
Percentage of teachers: Mean= 4.0	—	—	16.7	66.7	16.7	
difficult to follow	1	2	3	4	5	easy to follow
Percentage of teachers: Mean= 4.3	—	—	22.2	27.8	50.0	
uninspiring	1	2	3	4	5	motivating
Percentage of teachers: Mean=3.8	—	38.9	44.4	16.7	—	
difficult to integrate into classroom teaching	1	2	3	4	5	easy to integrate into classroom teaching
Percentage of teachers: Mean= 3.8	5.6	5.6	11.1	55.6	22.2	
too short	1	2	3	4	5	too long
Percentage of teachers: Mean= 3.2	—	5.6	72.2	22.2	—	
too little information	1	2	3	4	5	too much information
Percentage of teachers: Mean= 3.1	—	11.1	66.7	22.2	—	

Note: Totals may not add up to 100 percent because of missing values.

Table 9: Reaction to Descriptive Adjectives: Student Magazine (N=12)

not useful in class	1	2	3	4	5	useful in class
Percentage of teachers:	16.7	—	25.0	33.3	25.0	
Mean= 3.5						
boring	1	2	3	4	5	interesting
Percentage of teachers:	—	8.3	25.0	33.3	33.3	
Mean= 3.9						
difficult to follow	1	2	3	4	5	easy to follow
Percentage of teachers:	—	16.7	16.7	25.0	41.7	
Mean= 3.9						
uninspiring	1	2	3	4	5	motivating
Percentage of teachers:	—	38.9	44.4	16.7	—	
Mean=3.8						
difficult to integrate into classroom teaching	1	2	3	4	5	easy to integrate into classroom teaching
Percentage of teachers:	8.3	25.0	16.7	16.7	25.0	
Mean= 3.3						
too short	1	2	3	4	5	too long
Percentage of teachers:	8.3	16.7	58.3	8.3	—	
Mean= 2.7						
too little information	1	2	3	4	5	too much information
Percentage of teachers:	—	41.7	41.7	8.3	—	
Mean= 2.6						

Note: Totals may not add up to 100 percent because of missing values.

Teachers commented on what parts of the teacher's guide they used with their classes; no distinct pattern stood out. Several teachers mentioned the animal trivia exercise (28 percent), crossword puzzles (22 percent), and activities from the polar region (17 percent), grasslands (17 percent), and temperate forests (17 percent) chapters. Most teachers who used the magazine (seven out of eight) went to the exercises at the back of the publication; two also had their classes read and summarize magazine articles.

There is no evidence that the print material was used as a framework in organizing teachers' presentations, as the designers of the learning system had anticipated. They appeared to pick and choose material, not at random, but in accordance with their own teaching style. In fact, some of the more enterprising teachers substantially modified the material to fit in with their own presentation. An example is one who presented the programs sequentially instead of offering segments by theme: he virtually rewrote the guide so that the material could be used by students on a program-by-program basis, rather than by theme. Another made a "textbook" for students by photocopying some parts of the guide and magazine, and added them to material from other sources like fact sheets from the Metropolitan Toronto Zoological Society.[1] However, for the most part, teachers just took the occasional exercises or activity from the *Habitat* print material.

The greatest strengths of the guide were thought to be: the suggested activities (50 percent), program listings or specific program information (39 percent), and descriptions of animal habitats or information about habitats (22 percent). More activities or information would have been useful (33 percent). A fifth would have preferred activities listed by program, not by theme, or would have liked a better way to integrate the guide information with program segments.

For those who read the student magazine (N=12), the greatest strength was thought to be the quizzes, activities, and puzzles at the end of the publication (58 percent). Weaknesses of the magazine were: the information was not related to the programs (25 percent); it was too short or should have had more activities (25 percent).

For a complete list, see tables 10 to 13.

Table 10: Strengths of the Teacher's Guide

	% (N=18)
Suggested activities	50.0
Program listings/specific program information	38.9
Description of/information about habitats	22.2
Provides ideas to incorporate into class; excellent teaching ideas	16.7
Background information/ support for teacher	11.1
Other	5.6

Note: Totals may exceed 100 percent because respondents could give more than one answer.

[1]These teachers provided copies of their material to the EPR research officer.

Table 11: Weaknesses of the Teacher's Guide

	% (N=18)
More activities/information would be useful	33.3
Would prefer activities by program, not theme	11.1
More connection of information to program/program segments	11.1
Answers for teachers; more detailed answers	11.1
Misc. format problems	16.7
Other	11.1
No problems/no comment	27.8

Note: Totals may exceed 100 percent because respondents could give more than one answer.

Table 12: Strengths of the Student Magazine

	% (N=12)
Quizzes/ activities/ puzzles	58.3
Information is at the appropriate level for students	25.0
Other	5.6
No problems/no comment	16.7

Note: Totals may exceed 100 percent because respondents could give more than one answer.

Table 13: Weaknesses of the Student Magazine

	% (N=12)
Information not related to theme/programming	25.0
Too short/ more activities would be useful	25.0
Too difficult for student level	16.7
The color	16.7
Other	16.7
No problems/no comment	16.7

Note: Totals may exceed 100 percent because respondents could give more than one answer.

Suitability to Junior-Level Students

Teachers thought the learning system was suited to its market of junior-level students. The vast majority thought the system suitable for grades 5 and 6; most thought it suitable for grade 4 (a quarter also believed the system was suited to grade 7s).

However, some teachers had reservations. Three-quarters thought the system would be very or somewhat easy to incorporate into their lessons. One-quarter thought there would be problems — these were teachers who did not like the segmented organization of the programs. Only two teachers (11 percent) thought their students would be able to understand all the information; three-quarters said their students would understand most of the information, and a sixth thought their students would understand some of the information.

Two teachers said they would not recommend the system to other teachers; again, these were teachers who had problems with the organization of the programs. The rest, however, said they would recommend the system. Several noted that they had already told colleagues about *Habitat*, and those colleagues were using *Habitat* in their classes.

Table 14: Suitability of *Habitat* for the Junior Level

"For what grade or grades would you consider *Habitat* best suited? Circle up to three answers.

	% (N=18)
Grade 1	—
Grade 2	—
Grade 3	11.1
Grade 4	66.7
Grade 5	83.3
Grade 6	83.3
Grade 7	27.8
Grade 8	11.1
Grade 9	—

Note: Totals may exceed 100 percent because respondents could give more than one answer.

STUDENTS

Students were administered a pre-test before they used the *Habitat* learning system. The pre-test contained questions that demographic characteristics; attitudes to science and scientists; and knowledge of science.

At the end of the test period, students were given a post-test with these same questions, and in addition were asked what they liked and did not like about *Habitat*. The pre-tests and post-tests were then matched. Four hundred and sixty students in 18 classrooms participated in both pre-test and post-test.

A "representative" subgroup of five or six students was selected by the classroom teacher from each of the 18 classes. Students were asked a few questions about the programs and learning system. Answers were recorded on audiotape and then transcribed.[1]

Sample Description

Students were divided between grade 4 (26 percent), grade 5 (38 percent), and grade 6 (32 percent). Eighty-seven percent were between 9 and 11 years old at the beginning of the evaluation. There were roughly the same number of girls as boys (48 percent female, 52 percent male).

The sample is not, strictly speaking, representative of Ontario junior students because the classes were selected to include an equal proportion of urban and rural students. Fifty-one percent were from urban schools, and 59 percent were from primarily rural schools.

Table 15: Student Sample Characteristics (N=460)

1. Grade	**%**
Grade 3	3.9
Grade 4	25.9
Grade 5	38.0
Grade 6	31.7
No answer, not applicable	.4
2. Age	**%**
Eight years old	3.3
Nine years old	19.6
Ten years old	37.4
Eleven years old	30.2
Twelve years old	8.5
Thirteen years old	.9
No answer, not applicable	.2
3. Sex	**%**
Girl	47.8
Boy	52.0
No answer, not applicable	.2

[1]Frequencies are not reported in this section, but only general directions or trends, for two reasons.

a) Students have not been specifically identified in the focus groups, which makes their comments difficult to quantify in any useful manner.

b) The pre- and post-tests serve as a more quantitative indicator of the knowledge and attitudes of students; focus groups are intended here as a means of clarification, of gaining insight into what students are saying.

Attitudes to Science

Science Compared with Other Subjects

Students were asked to pick their favorite of five subjects: reading-writing, science, social studies, math, and French. Science was ranked second in the pre-test, behind math but ahead of social studies, French, and reading-writing. The post-test showed these rankings virtually unchanged, as can be seen below in Table 16.

Table 16: Science Compared with Four Other Subjects

"Check off the school subject that you like the most"

	Pre-Test %	Post-Test %
Math	32.4	31.7
Science	**28.9**	**30.0**
Reading and writing	19.6	18.5
French	13.7	12.4
Social studies	5.0	6.3
No answer	.4	.2

In order for us to get a more comprehensive view of science in relation to other subjects, students were asked to name the in-class activity they most enjoyed. Here, where the choice of activities was unlimited, science was shown to be less important than it may have appeared in the above question. In the pre-test, most students favored gym (29 percent), art class (22 percent), or math skills (22 percent); science was a preferred choice of 6 percent of respondents. In the post-test, science had slightly improved in popularity — 11 percent of respondents thought it their most enjoyable class activity — but more students still preferred gym (30 percent), art class (17 percent), or math skills (17 percent).

There is no strong evidence to show that *Habitat* raised the popularity of science compared with other class subjects or activities.

Table 17: Science Compared with All Other Class Activities

"Of all the activities you do in class, which one do you find the most enjoyable?"

	Pre-Test %	Post-Test %
Gym	29.1	30.0
Art class	21.7	17.4
Math skills	21.5	17.0
Language skills	8.5	8.5
Reading skills	6.3	5.2
Science science activities	**6.1**	**10.9**
French	2.4	2.6
Computers	1.1	1.1
Band/music	.9	.9
Social studies	.7	1.7
Drama	.4	.2
Environmental studies	—	.9
Other	2.6	3.5
No answer	2.4	3.5

Students' Approval of Learning Science

Students were quite approving of science before participating in the evaluation; and exposure to *Habitat* did not appear to change anything. When asked how much they liked learning science, 95 percent of students in the pre-test liked learning science very much, or thought it was "OK." In the post-test, 93 percent liked learning science very much, or thought it was "OK."

Table 18: How Much Students Like Learning Science

	Pre-Test %	Post-Test %
Like it very much	48.0	47.4
It's okay	46.5	45.4
Not very much	3.0	3.5
Not at all	1.7	1.7
No answer/not applicable	.7	2.0

In the focus groups, students were asked how much they liked science before, and how much they liked science now. Most said they liked it more, after having seen the programs and participated in the class activities. If they had liked science before, they found the *Habitat* information interesting and liked science more as a result; if they had not liked science before, they found that *Habitat* made the subject more palatable.

> "I like science a lot right now and I've liked it since I was in grade 1. I have more knowledge of science now."
>
> "At first I didn't really know too much about science. Then after *Habitat* I learned more about it. I like it better. I liked it before but didn't know too much about it."
>
> "I like science a lot now. Before I didn't like it at all except in grade 3 and 4 you got to dissect things and that."
>
> "I didn't like it before, but now it's all right. (I started liking it) when we started talking about habitats. 'Cause I really like animals. I want to work in a pet store."

Student Opinions of Scientists

Participating students were provided with a list of 10 words or phrases describing scientists. There were four positive descriptors ("kind, likes people, interesting, smart"), four negative descriptors ("not a nice person, unfriendly, boring, doesn't care about people"), and two neutral descriptors relating to science activities ("likes to read, works with animals").

Students already were very approving of scientists before using the *Habitat* system, yet were even more so after *Habitat*. In the pre-test, almost all students thought scientists were smart (96 percent), and interesting (90 percent) and they continued to think so at the time of the post-test. After using *Habitat*, more students thought scientists liked people (63 percent to 73 percent) and were kind (66 percent to 77 percent).

Table 19: Student Opinions of Scientists

"Please circle all the words or phrases that you think describe a scientist."

	Pre-Test %	Post-Test %
Positive Descriptors:		
Smart	95.7	96.3
Interesting	89.8	91.3
Kind	65.9	76.5
Likes people	63.0	73.3
Negative Descriptors:		
Boring	6.3	7.4
Unfriendly	2.2	2.6
Not a nice person	.9	1.7
Doesn't care about people	.9	1.5
Descriptors relating to science activities:		
Works with animals	75.2	81.1
Likes to read	65.7	79.1
No answer	.2	.4

Reading of Science Magazines and Viewing of Science Programs

In the pre-tests, students were asked what books or magazines on science they had read since the start of the school year, and what television programs they had seen. Most had read several science magazines and seen several science programs:

- The most popular **magazines** were *Owl* (64 percent of students), *National Geographic* (58 percent), *Chickadee* (44 percent), *Ranger Rick* (40 percent), and *Dr. Zed* (33 percent).

- The most popular **television programs** were *The Edison Twins* (63 percent), *The Nature of Things* (53 percent), *Wonderstruck* (43 percent), *National Geographic* (42 percent), and *The Science Alliance* (20 percent).

By the time of the post-test, students had increased their use of most of these magazines and programs by between 10 and 20 percent. We should be cautious in interpreting this, however. It may mean that because of the time lag between pre-test and post-test (three months), more students have had the opportunity to read at least one issue of each magazine, or view at least one program from the television programs.

Table 20: Student Reading of Science Magazines

"Check off the books or magazines you have read since you started school in September"

	Pre-Test %	Post-Test %
Owl	64.1	75.9
National Geographic	58.3	70.2
Chickadee	43.7	59.3
Ranger Rick	39.6	54.8
Dr. Zed	32.8	46.5
Discovery	11.3	18.5
Popular Science	12.2	14.1
World	6.5	8.0
Flabbergast	2.4	3.5
Seeds 5	2.8	2.2
Other	17.6	12.0
No answer	7.2	2.4

Table 21: Student Viewing of Science Programs

"Check off the television programs on science you have seen since you started school in September."

	Pre-Test %	Post-Test %
The Edison Twins	63.3	70.2
The Nature of Things	52.6	55.4
Wonderstruck	42.8	50.0
National Geographic	42.4	59.6
Mr. Wizard's World	27.4	26.3
The Science Ailiance	19.8	30.9
Nova	16.5	23.7
Discovery	15.4	26.7
Not Another Science Show	14.3	28.7
Take a Look	13.5	23.7
Owl TV	6.7	9.8
Vista Presents	7.0	12.4
Other	9.6	7.4
No answer	5.7	4.3

What Students Liked Most about Their Science Class

In both pre-test and post-test, students were asked what they liked the most about their science class. In the pre-test, students most frequently mentioned specific experiments or projects — e.g., an experiment on using pendulums, or on growing food. In the post-test, experiments and projects had declined in favor (from 42 percent to 19 percent of respondents) while slightly under a third of the sample (28 percent) cited *Habitat* as that part of science class that they liked the most.

Table 22: What Students Liked Most about Their Science Class

	Pre-Test %	Post-Test %
Science experiments/projects	**41.9**	**18.9**
Specific units	16.7	13.0
Specific animal study	10.2	11.5
Voyage of the *Mimi*	3.9	5.7
Science fair	3.9	5.0
Field trips	2.8	1.1
Science tapes/films	.2	5.2
Habitat	**.2**	**28.3**
Have not taken science yet this year	3.3	.2
Other	9.4	7.8
No answer	10.2	10.2

Note: Totals may exceed 100 percent because respondents could give more than one answer.

What Was Liked about *Habitat*

In the post-test, students were asked what they liked about the learning system. A third (32 percent) most appreciated the characteristics and habits of animals as shown in the programs and print material; an additional nine percent specified individual animals they liked, such as the seal. Twenty-one percent said they liked watching the programs, without specifying why. Ten percent most liked the *Habitat* activities and class projects they engaged in.

As they remarked in the post-test questionnaires, students liked the stimulation provided by new information about animals and their habitats — both in the programs and in the associated exercises.

> "I liked to find out about the underwater animals. Like the sharks and when they talked about the whales — their sizes and stuff like that."

> "I liked watching the videos because you could find out more about different animals and what type they were."

> "I liked my project. About orangutans. I like orangutans because they are like people, and they look like people. You write out [as part of the project] the adaptations they have and the habitats."

> "I liked how I studied on how (animals) lived, and where they lived. Different ways of how they find food; different ways of how they eat their food. How they move: some move in water, some on land, some in the air."

Several also mentioned how they liked the legends: as one said, "I think they are strange and sometimes they are funny." There was a negative side to this, as will be shown below.

Students often liked the class activities that went along with the series. In many cases this "research" appeared to provide enough stimulation to satisfy the students, while not enough to overwhelm them.

> "(I liked) the projects the grade 4s did on the animals they liked. Because it was kind of easy and kind of hard."

> "I liked it when the videotapes would play all these animals and sometimes that is the animal that you are doing your project on, and it really helps having those videos so you can collect ideas and you could get them faster than if you looked at a book. Because if you were looking at a book or an encyclopedia, first you would have to find the book that it is in, then you would have to read through the whole thing, then you have to try and write it all down."

However, as with the legends, not all students agreed with this.

What Was Not Liked about *Habitat*

Students were less vocal in saying what they did not like about *Habitat* — nearly half (47 percent) said that there was nothing wrong with the programs, or left the question blank. This should not be interpreted too freely because children of this age do not have the critical skills and/or confidence to articulate negative criticisms.

Of the students who did respond, most frequent complaints were with class activities associated with *Habitat* (19 percent of all students). In addition, some students had problems with the legends (8 percent), and several thought the programs were too fast, or too short (6 percent).

Table 23: What Students Liked Most about *Habitat*

	%
Characteristics and habits of animals	31.7
Specific animals	8.5
The tapes – watching programs	20.9
Activities – class projects	9.8
Legends	7.8
Photography	6.1
Specific shows/themes	6.1
The information – learning generally	2.8
Music	2.2
Variety of animals	2.0
Everything	3.3
Other	4.8
Nothing/No answer	1.3
Not applicable	1.7

Note: Totals may exceed 100 percent because respondents could give more than one answer.

Table 24: What Students Did Not Like about *Habitat*

	%
Class activities	18.5
Legends	8.0
Too short/fast	5.7
Do not like specific animals	3.5
Tapes are boring/the tapes/everything	3.0
Photo album	2.8
Tape changes	2.2
Beginning questions	1.7
Destruction of animals/habitats	1.1
Other	8.5
Nothing/Not applicable	47.2
Not applicable	.2

Note: Totals may exceed 100 percent because respondents could give more than one answer.

In the focus groups, many students claimed that there was nothing wrong with *Habitat* — that they liked "everything." However, when they did describe problems, their replies closely mirror criticisms from post-test questionnaire results.

While there was no one major or consistent problem, participants from several focus groups complained that the program segments were too short.

> "I liked mainly everything, but some of (the segments) were kinda short. Some of them — you just see a little glimpse of the animal and maybe where it lived, and then (the program) went on to another animal."

> "I didn't like how they didn't spend too much time on a certain subject. I wish that they had spent more time on a certain thing — like a whole program."

> "I think what happens is that they start out with one thing and then you get your head and you come back and it's a different animal and you're totally lost."

> "It just starts to get interesting, then it just changes."

Several students had mentioned how they liked the legends. Others, however, found it difficult to move from the programs' normally factual orientation to the more fantastic orientation of the legends: "We're learning science," said one, "and that's not scientific." Some of the legends tended to cross what these junior-level students perceive as the border between the strange and the completely unbelievable, as this conversation excerpt may illustrate:

> "I didn't like the legends that well...they weren't really that important. It seemed like it was just to fill in time or something."

> "Some of them were really neat. Some were pretty good, others were just weird. It gave you a lot of time, if you were writing notes quickly on our paper, to catch up. Some were sort of unbelievable (like) the one with the rabbit with the long tail [reference to "How Rabbit Changed His Appearance," program 20]. And how the porcupine got its spikes [reference to "How Porcupine Got Its Quills," program 19]."

"I didn't like the legends either. Most of the things they said, you know it's not true. Because if you pulled someone's leg it wouldn't grow longer, and if you pulled someone's tail, it wouldn't rip."

"Same thing. The legends. Because you know most of them aren't true."

"I didn't really mind them. Some of them were okay." (*Interviewer: An example?*) "The one with the loon, when all the birds were sitting there [reference to "How the Loon Got Its Call, "program 9]."

"The only one I didn't like was the porcupine. That was the only one I thought was dumb. The other ones were pretty good."

(Interviewer to class: Do you remember the porcupine story? What did you think of that one?)

"Well, it was okay, but it doesn't seem that realistic. The porcupine looked pretty funny. It would have some skin. But when they showed it, it looked red."

This may point to a credibility factor. Like adults, children have definite ideas of what is credible — what is potentially true — and what is not. Apparently the legends crossed that boundary on occasion.

Another problem reported by a few younger students had to do with children identifying with an animal. For example, children would see and like some smaller game animal — who would then be eaten by some larger predator. Some of the children do not appear to have developed sufficient objectivity to react with indifference.

"If you liked the prey, and you're doing a project about the prey, and the thing that eats the prey gets it. That's when I get mad — when the other animal eats the prey that I like."

At the same time, some of the male children apparently relished this inevitable byproduct of the food chain. One noted that he liked "watching the lion when it snuck up on the rabbit and pounced and got it."

Students were less ambivalent about the photo album. Several could not see the point of it.

"Well, I hate the part when they tell about the people and their animals. I wish they would cut that out and put in some more about the animals."

"I didn't like the part where they had a person and their animal, and seeing what they want on a show. It's just weird."

"I didn't like that part either. 'Cause it's for little kids; it's boring. Showing things they don't need to."

"I didn't think it fit in with the show."

Most frequent complaints about learning activities concerned the *amount* of notes some students had to write, while writing the programs: they did not appear to mind writing notes per se — some just thought there was too much of a good thing.

"(The student did not like) writing down the notes after the program. Because we had these long notes, and we had to do charts."

"I liked the crossword and the trivia and some of the notes I liked writing down, but some were kind of long and my arm started falling off."

Student Learning

Focus groups

In the focus groups, participants claimed that they learned a lot of details about the animal kingdom.

> "They were animals that I've never seen before, and it was interesting to learn about them."
>
> "I liked learning that there are other animals than just the basic storybook kind of animals."
>
> "The main thing I learned was the different kinds of species: what's the difference between an insect and a kangaroo; how these different species live. Now I know what a carnivore is, stuff like that. I know what carnivore means. I know what coldblooded means."
>
> "Basically what everyone else said: what the animals' habitats are, where they lived, what a carnivore is, all that stuff, how they catch their food, how they survived during the winter. All that stuff."

"Helping" and "hurting" nature

The students were asked to give an example (in their own words) of how people can hurt nature, and how people can help nature.

It was difficult to see any important differences between the pre- and post-test. Most frequently, students gave answers that were correct, but not at all detailed:

— They would say that people hurt nature by hurting animals, and can help nature by not hurting animals; or they would say people can hurt nature by cutting down trees, and help nature by not cutting down, or by planting trees.

We can be reasonably certain that in response to the first question, these students put down the most obvious thing that came into their heads; they then inverted their answer for the second question. These answers show a grasp of the principle of "nature" as a finite resource that can be damaged yet also restored by people. However, a majority of students did not go beyond this elementary concept in the post-test.

There are, it is true, more sophisticated answers, and these answers tend to be more numerous in the post-test. For example, in the pre-test 9 percent of students said that destroying animals' natural habitats would hurt nature; 18 percent, or nearly a fifth, said so in the post-test. But on the whole, this test component shows no distinct increase in knowledge on the part of the student. This may be because most students at this stage do not have the writing skills to respond adequately to this type of open-ended knowledge question.

For a complete list of answers, see tables 25 and 26.

Table 25: Student Examples of How People Can Hurt Nature

"Give an example of how people can hurt nature."

	Pre-Test %	Post-Test %
Hunting animals/hurting animals	31.5	23.9
Cutting down trees/forest	28.3	35.2
Polluting lakes, rivers, air, etc.	11.7	10.4
Fires (careless smoking, etc.)	10.0	13.0
Picking at trees and flowers/breaking branches, vandalism	9.3	3.5
Destroying animals' natural habitats	9.3	17.6
Building houses/big cities	7.0	11.5
Dumping garbage/littering	5.9	5.9
Destroying nature/everything	5.7	3.7
Other	1.7	2.4
No answer	1.5	1.1

Note: Totals may exceed 100 percent because respondents could give more than one answer.

Table 26: Student Examples of How People Can Help Nature

"Give an example of how people can **help** nature."

	Pre-Test %	Post-Test %
Planting trees	25.7	24.6
Not hurting/hunting animals	18.9	17.6
Not littering/picking up garbage	10.7	8.7
By leaving branches/forests/jungles alone	10.7	12.8
Feeding/taking care of animals	10.4	7.0
Not cutting down trees/forests	8.9	10.2
Stop polluting	7.8	8.0
Not putting fires in forests, or stamping out a fire completely	4.3	3.7
Making sanctuaries/homes foranimals	4.3	5.2
Other	4.3	5.2
No answer	3.7	2.6
Not destroying – saving animals' natural habitats	2.0	8.0
Stop building houses/roads/buildings	1.3	4.6
Not applicable	.2	.2

Note: Totals may exceed 100 percent because respondents could give more than one answer.

Multiple-Choice Questions

In both tests students were asked seven multiple-choice questions, based on material covered in the *Habitat* programs and print material. The questions asked were:

— What is the definition of a carnivore?

— Which out of *four conditions* is true in a food chain?

— What of *three reasons* is the main reason why animals become extinct today?

— Which out of *four animals* is coldblooded?

— Which out of *four animals* is not an insect?

— Why does a rabbit's fur turn white in the winter?

These answers were marked either correct or incorrect; each student was then given a score, from 0 to 7, where 0 meant that all questions were incorrect, and 7 meant that all seven questions were correct.

For the most part, there was substantial improvement in knowledge scores between pre-test and post-test:

— In the pre-test, students scored an average of **3.8** out of 7.

— In the post-test, students scored an average of **5.3** out of 7.

Forty-four percent of students had "failed" the pre-test — i.e., they had three or fewer correct answers — while 56 percent "passed," i.e., had four or more correct answers. In contrast, 13 percent of students in the post-test had three or fewer correct answers; 87 percent had four or more correct answers (see Figure 3).

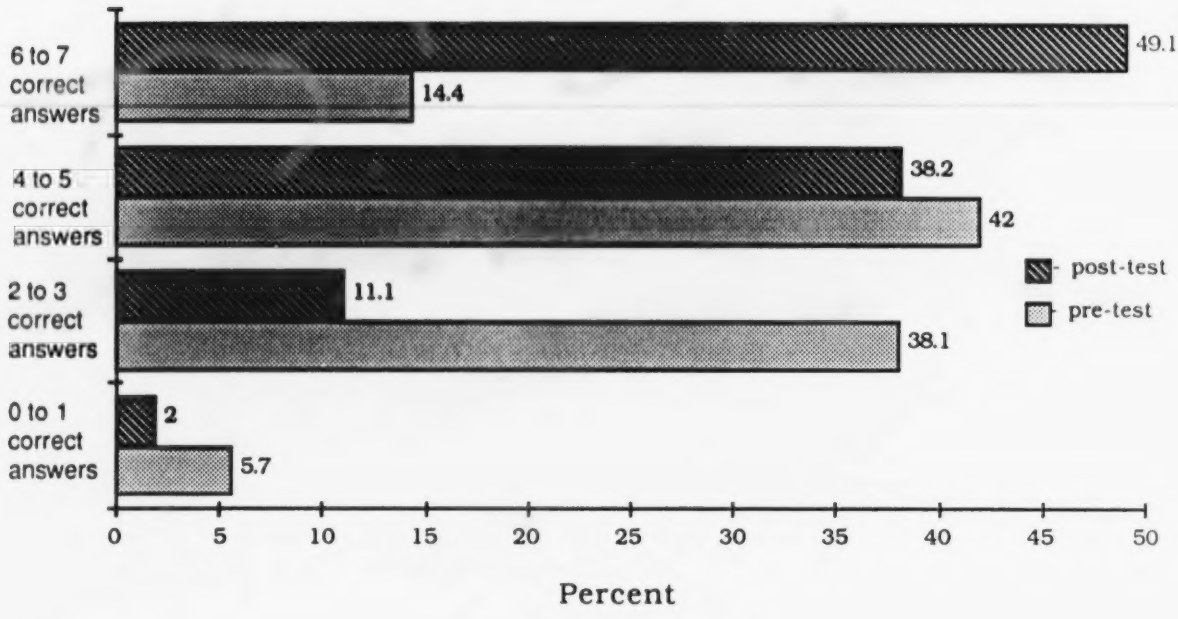


Figure 3
Multiple-Choice Knowledge Scores:
Pre-Test and Post-Test Compared

(the sum of correct multiple-choice answers, for a total of seven)

Participants found some questions easier to answer than others. When asked in the pre-test why a rabbit's fur will turn white in the winter, only a fifth gave incorrect answers. A very high proportion of students from two grade 4 classes correctly identified a spider as not being an insect. It turned out that before the *Habitat* evaluation, both classes had been taught a unit on spiders.

Table 27: Answers to Specific Multiple-Choice Questions
(Correct answers underlined)

	Pre-Test %	Post-Test %
A. What is a carnivore?		
An animal that lives underwater	4.6	3.0
A meat-eating animal	47.0	86.3
An animal that lived millions of years ago, but is now extinct	18.5	2.2
A grass-eating animal	11.3	8.0
No answer	18.7	.4
B. In a food chain...		
The animal that is strongest wins	19.6	9.3
All animals depend on each other	45.4	75.7
The largest animal is usually the most important link	23.5	13.0
Not applicable (no answer)	.2	—
No answer	11.3	2.0
C. Which of these is a mammal?		
A penguin	32.2	20.2
An ostrich	13.9	4.3
A bat	39.8	68.3
An eagle	9.1	5.4
Not applicable	.2	.2
No answer	4.8	1.5
D. What is the main reason why animals become extinct today?		
People hunt them for food	27.4	17.8
People hunt them for sport	23.5	14.1
Their natural habitat is destroyed	48.0	67.6
Not applicable	—	.4
No answer	1.1	—
E. Which one of these animals is coldblooded?		
A penguin	9.6	10.4
A polar bear	16.7	7.8
A frog	59.8	70.0
A seal	10.0	11.1
No answer	3.9	.7
F. Which of these is not an insect?		
A beetle	4.8	2.6
A spider	59.8	71.1
A bee	28.5	18.3
A grasshopper	5.9	8.0
No answer	1.1	—
G. In winter, a rabbit's fur will turn white because...		
The white fur blends with the snow	80.2	86.5
The white fur keeps the rabbit warmer than brown fur	8.7	7.2
The rabbit likes to change the color of its coat at different times	9.1	5.7
Not applicable	.6	.4
No answer	1.3	.2

Animals of the Rain Forest and Desert

Students were asked to name three animals that lived in the desert, and three animals that lived in the rain forest. Answers were marked according to the following scale:

— A wrong answer or no answer was given a value of **0** (zero)

— An answer that was not incorrect, but extremely vague (e.g., "insects"), was given a value of **1**

— An answer that was essentially correct, but missing specific descriptors (e.g., "monkey"), was given a value of **2**

— An accurate answer (e.g., "trapdoor spider") was given a value of **3**.

Since students were asked to name three animals, and each example was given a value of between 0 and 3, the lowest possible score for each question was 0; the highest was 9 (3 accurate answers).

There was an enormous range of answers — over 100 were enumerated. Grading was based on whether the answer was accurate, not whether it was mentioned in *Habitat*.[1]

Student scores in the post-test showed a substantial improvement from pre-test results. In the rain forest question, students had an average score of 1.8 out of 9 on the pre-test — and 3.4 on the post-test. Nearly half (44 percent) gave completely incorrect answers in the pre-test; 17 percent gave completely correct answers in the post-test (see Figure 5).

On the desert question, students scored much higher initial pre-test scores — an average of 4.4 out of 9.[2] However, this was improved in the post-test, where they achieved an average score of 5.3 out of 9 (see Figure 4) .

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[1]The enormous variety and versatility of animal species led to some problems when the animals were coded. For example, the *Habitat* programs would sometimes state that an animal lived in the desert; however, when the research officers consulted such sources as the *Larousse Encyclopedia of Animal Life*, they would find that this adaptable and hardy animal also resided in the rain forest. Such an answer would be coded as correct, although it may have been a guess by the student -- a case of being saved by the bounty of nature.

[2]They were aided by a nearly universal knowledge that the camel does, indeed, live in the desert. Realizing this was sufficient to give students a score of 3 out of 9, and this inflated their scores relative to the rain forest component.

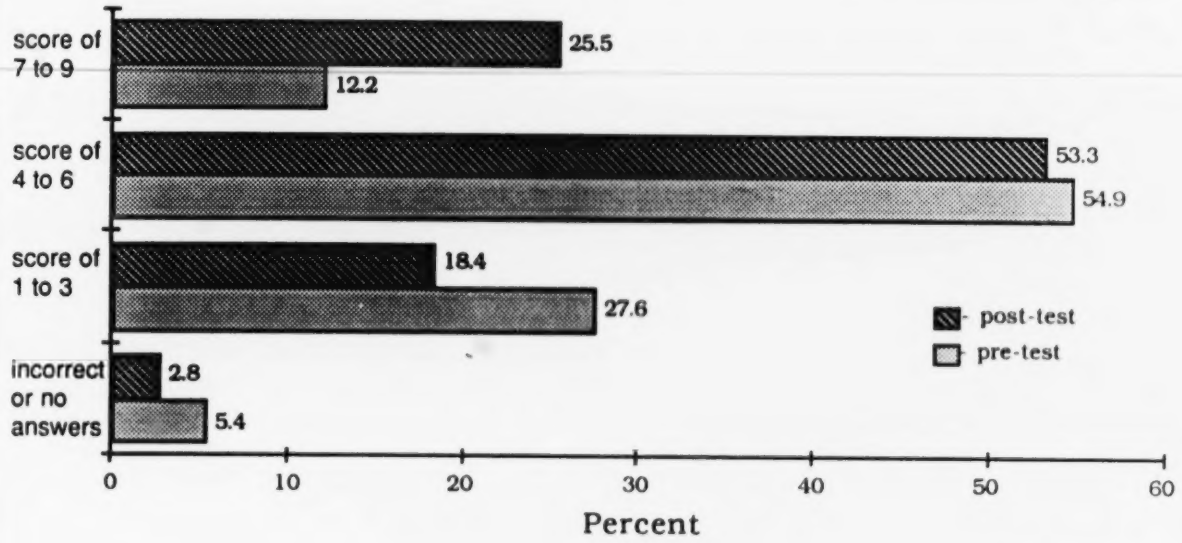

Figure 4
"Desert" Animal Question Results:
Pre-Test and Post-Test Compared

(the sum of marked answers,
for a total score of nine)

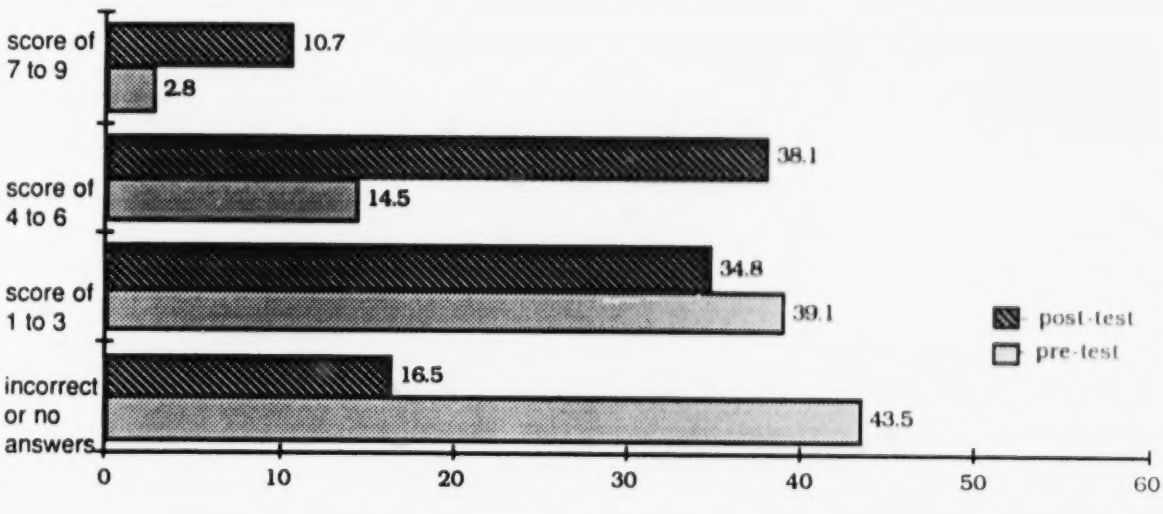

Figure 5
"Rain Forest" Animal Question Results:
Pre-Test and Post-Test Compared

(the sum of marked answers,
for a total score of nine)

Watching *Habitat* at Home

Students in the focus groups did not agree on whether they would watch *Habitat* at home. Some were quite positive; some gave the time-honored "only if nothing I like is on"; a few bluntly stated that they would not watch if they had a choice.

"I would watch it at home because it was a good show."

"(I would) because I like watching TV but not just cartoons and all that. I like to learn about animals and nature. I watch cartoons but I like *Habitat* too."

"If I had the time I would."

"I'd watch *Habitat*, but if there was something else on that I liked, I'd watch (that instead)."

"No, because when I get home from school, I don't want to watch educational TV, I like to watch comedies."

"No I wouldn't because I would rather go outside and play with my friends."

SUMMARY-DISCUSSION

Teachers

Results of focus group and field tests were similar

Teachers evaluated the *Habitat* learning system in two ways: in focus groups and in a more lengthy field test. In the focus groups, teachers (who had earlier read the print material) were shown two representative programs, answered a questionnaire, and engaged in focus group discussion. In the field test, teachers in six Ontario boards of education used the learning system in their classrooms for between two and three months; they completed a questionnaire at the conclusion of the test period.

Both focus group and field test participants came up with similar results. This is striking because the methodology of the two is quite different. The focus group discussion is more normal in "formative" evaluations: it concentrates on impressions of a learning system: the opinions of teachers who use their experience to judge potential effectiveness. A field test, on the other hand, judges how a system has fared in actual use.

The Learning System As a Whole

Participants approved of the learning system as a whole

Both groups approved of the learning system as a whole — although the focus group was only moderately favorable, while the field testers were quite favorable. While the focus groups and field testers tended to praise and criticize the same things, the field testers had the opportunity of actually using the system before judging it. This may have given them a more balanced perspective of the problems, and therefore, a more favorable opinion.

The Programs

Participants approved of the programs

Both had high opinions of the programs: they thought them useful in class, interesting, motivating, and easy to integrate into classroom teaching. There was a certain ambivalence about the pace and amount of information — some thought the programs were too fast, and were difficult to follow. In focus group discussion and open-ended comments, some teachers noted that the programs demanded total concentration by students, because there was a great deal of new information that was shown very quickly.

For the most part, teachers thought this an advantage. In open-ended questions, they said the programs were entertaining to children, and liked the quality of the information or facts in the programs. They were impressed by the photography, which they believed caught the students' interest and demonstrated principles of science.

Specific questions on format also demonstrated the satisfaction with program "quality." A majority of field testers thought the questions at the beginning of the program were effective; most thought the background music added to the programs; all said they liked the photography.

There was a problem with the number of unrelated short segments

Criticisms focused not on the artistry of the shows, but on how to use them. The most serious flaw was thought to be the number of unrelated short topics put into each program. The programs have a magazine format — a number of topics on unrelated themes. However, the teacher's guide was organized thematically — according to habitat (tropical rain forest, etc.). Successful use depended on videocassette technology. The theory was that teachers would select segments on one theme from different programs, using such VCR features as rewind, counter, and memory.

Actually, teachers felt this to be extremely inconvenient. This was commented on extensively in the focus group discussion as well as focus group and field tester questionnaires. They disliked the time it took to locate segments: it was a drain on an already overextended schedule, and they had an additional problem in obtaining VCR equipment. For example, at one school (site of a focus group), all junior classes were held in portable classrooms, so teachers had to go outside their classrooms to use VCRs. Under such circumstances, finding time to locate several segments from several programs would be an ordeal. Even if teachers could get the time, the brevity of the segments (three-four minutes for longer segments, and less than a minute for shorts) would dissuade them from making an effort.

Teachers preferred to use program segments on themes, but had trouble doing so with *Habitat*

Teachers in the focus group were asked how they would *prefer to use* the television programs, while teachers in the field test were asked how they *had used* the programs.Given a choice, teachers in the focus group said they would prefer to use program segments on related themes — which was the recommended strategy for *Habitat*. Indeed, half the field testers *did* use the programs that way; and a quarter showed the programs to their class in sequence, from program 1 to program 20 (some also used both strategies).

However, all field testers who organized their teaching thematically ran into trouble; those who showed the programs in sequence had no trouble. From the sample, it would appear that most teachers would prefer to teach thematically — but had trouble doing so with *Habitat*. Their dissatisfaction therefore does not stem from the organization of the programs into thematic segments, but rather from the effort and time needed for the teacher to organize these short disparate segments scattered over 20 programs.

There is no evidence that VCR technology is fully utilized

Much has been written about the video revolution, not all of it supported by fact. Robert Carlisle, in *Video at Work in American Schools*, talks about the enormous growth of VCRs in education. He says, rhetorically, that the "voices of teachers and others" identify several attributes of VCRs (without saying how many voices and why they said this). Two characteristics were: that the VCR is easy to use; and that it is "flexible," i.e., you can do many things with it. Carlisle effectively demonstrates how much teachers like the VCR's ease of use; as one says, "there's nothing hard about using it. All you have to do is shove in a cassette."[1]

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[1]Robert D. B. Carlisle, *Video at Work in American Schools* (Bloomington, Ind.: Agency for Instructional Technology, 1987), pp. 21-22. Carlisle, who is overtly in favor of video technology, talked to 160 people in 12 states, but gave results of an anecdotal nature, without any specific breakdown of questions asked, or of frequencies given. For information on the increase of VCRs compared with other media, see Charles E. Nelson, Theresa Prosser, and David Tucker, "The Decline of Traditional Media in the Classroom", *Educational Technology*, January 1987, pp. 48-49.

Yet it has not been demonstrated that teachers who are attracted to VCRs because of their simplicity will then take advantage of the more sophisticated elements of the technology. An analogy can be made with computers: while the the top microcomputers have enormous potential, most people use them for basic word processing.

When VCRs first became a factor to be reckoned with, some articles predicted that they would change the general characteristics of television.[1] This has not happened; while it is true that video technology could change the way television is viewed, there is no evidence that people have used anything beyond the most elementary time-shifting and play features.[2] As far as use in the school is concerned, one study found that few teachers preview video material before showing it to their class.[3] The teachers in this study are probably typical in being overwhelmed by VCR setup time and logistics.

Legend segments also criticized

Several participants also criticized the change from photography to the story board "legend" segments. A couple of science teachers disliked the idea of putting a legend in the programs on general principle. Others were worried that children would have difficulty accepting the abrupt change in format — the instant change from realism and fact to cartoon and fantasy.

Teachers in both groups were asked to rate the program segments. The results were very similar: positive rating of the longer segments; ambivalent rating of the short segments and legends; somewhat negative ratings of the photo album segments.

Curiously, although some teachers were quite vocal in their assessment of the legend segments, they did not say much about the lower-rated photo album segments. Perhaps the photo albums were thought ineffective but not distracting — whereas the legends involved potentially distracting changes in format and style.

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[1]See, for example: Robin Scott, "Television Is for Now-- Video Is Forever" (*Intermedia*, July-September 1983); and Julian Aynsley, "Visual Literacy and the VCR" (*Broadcaster*, April 1984, pp. 6-8), who concluded that "as the information revolution continues to reshape our world and our view of it, the VCR, like the computer, will prove to be one of those turning-point technologies which alters fundamentally how we think about all information available to us."

[2]See Lynda Ashley, "Understanding VCR Owners" (*Broadcaster*, January 1986) for information about "zipping" of commercials (i.e., using fast-forward to bypass commercials) , which appears to be the one innovation in VCR use.

[3]Dr. Bruce K. Johnson, *Film and Video Utilization Study* (Calgary Board of Education, 1983), pp. 32-36.

The Print Material

Print material was used and well received

Use of the print material was fairly widespread — all field testers read the teacher's guide, and all but one used the exercises or activities; two-thirds read the student magazine, and half used the magazine exercises or activities.

Reaction to the guide was, if anything, more favorable than reaction to the programs; reaction to the student magazine was less so, but still favorable. Both focus group and field-testing teachers agreed that the material was useful in class, interesting, easy to follow, motivating, and easy to integrate into the classroom.

More activities and integration with the programs suggested

There were a few negative comments. Some teachers felt that there should have been more activities or suggestions; while most were satisfied with the guide, a majority thought the student magazine did not have enough information. In the focus group (and to a much lesser extent, in the field test) a couple of teachers pointed out what they perceived as format problems — the uniform olive green color of the material being one complaint.

As mentioned above, teachers had problems in coordinating the program segments, using VCRS, which was the strategy advocated in the guide. Rather, many suggested that the programs be reordered to present one theme on one tape. A fifth of the sample also suggested that they would have preferred a better way of integrating the guide information with the programs. Several suggested that they preferred information to be listed by program, not by theme.

Guides did not serve as a framework

But this did not appear to be overly detrimental, because the guide or manual did not serve as a framework for organizing teachers' presentations. Instead, teachers went to the guide and manual to pick and choose from what material was offered. The extent of this appeared to depend on the enthusiasm and time of the teacher: one virtually ignored the guide; another made the effort of substantially changing the order of the material, so that it could be used on a program-by-program basis. Since the guide and manual had many easily removable, stand-alone exercises, they were ideal for this sort of adaptation.

It is possible that teachers' attitudes to the print material may be another reason for dissatisfaction with the organization of the video. Although there is not much available on this subject, other EPR evaluations have indicated how teachers look to print support as just that — a backup to the video, which should assist the teacher with background on the programs, and suggested student activities. The *Habitat* print material had these characteristics and so was favorably judged.

Suitability of the Learning System

Teachers thought it suitable for grades 4-6

Two-thirds of both focus group and field testers thought *Habitat* was suitable for grade 4 students, and three-quarters thought it suitable for grade 5 and 6 students; a minority also thought it suitable for grades 3 and 7. Teachers thought that students would understand most of the information (although few thought they would understand all the information). Almost all said they would consider using the system with their students (the focus group) or would recommend the system to other teachers (the field testers). Some resistance came from those teachers who disagreed with the program setup of unrelated short segments.

Students

All students (N=460) filled out a pre-test before they used the learning system, and a post-test after they had finished with the learning system. In addition, a representative subgroup from the 18 classes participated in focus group discussion.

Attitudes to Science

Student attitudes to science and scientists were unchanged

Habitat does not appear to have demonstrably changed the attitudes of students to science. In the pre-test, most students liked science, although only a small percentage said it was their most enjoyable subject. The majority favored gym, art class, and math skills. These rankings were virtally unchanged in the post-test. Perhaps because pre-test attitudes to science were already quite favorable, there may not have been much room for improvement.

Before using *Habitat*, participating students had a good opinion of scientists. They were slightly more approving after using the learning system. Almost all participants thought that scientists were interesting and smart; after *Habitat*, they were more likely to think scientists were kind, and liked people. They were also more likely to think that scientists like to read, and work with animals.

Educators often fear that children perceive scientists as unidimensional (and nasty) fanatics – a view supposedly foisted on them by television.[1] It is comforting to know that participating students did not take this view: they viewed scientists favorably, and as human beings; and they liked science.

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[1] "Schools and the media take much blame for this lack of understanding (of science)....The most troubling attribute of science as presented in the media seems to be the alienation of its practice and practitioners from everyday people and life. Since science is held to be an intellectual activity, scientists are cast in a stereotypically intellectual image: the white coat, the absent-mindedness, the myopia of the zealous researcher. In keeping with the intimidating stereotype, scientific instruments are left as a mystery, yet portrayed as indispensable." Philip Morrison and Phyllis Morrison, "Beyond Doctor Bunsen Honeydew," in *TV, Science and Kids*, edited by Kim Hayes (Reading, Mass: Addison-Wesley, 1984), pp. 34-38. See also Steven J. Marcus, "Humanizing Doctor Zarkov" (pp. 77-82), in the same publication.

Unfortunately, there is some evidence (from American sources) that children start off their school career with an open approach to science and scientists; but this attitude becomes distinctly negative as students get older. If this is true, it is not students at the junior level, but their older siblings, who will have be be convinced that scientists are human and that science is worthwhile. [1]

Reading and Viewing Habits

It is interesting to note that all the top five magazines read by the student sample were those specifically aimed at children (including *National Geographic*, which is made for "all ages"), while one of the top five science programs — *The Nature of Things* — was usually perceived to be for adults; two other "adult" science programs (*Nova* and *Vista Presents*) were also quite popular. Perhaps this is because adults have more influence on children's reading habits than television-viewing habits: adults choose the material on science that children read, but all television programs are available through a remote control.

Reading and viewing habits were not changed

During their school year, most students had watched at least a few science programs and read a few books or magazines on science. *Habitat* does not appear to have had a noticeable effect on this. In the post-test, students appear to have read more magazines on science, and viewed more series. The differences were not major and may be explained by the time between pre-test and post-test: students had more opportunity to view and to read.

Acquisition of Knowledge

Student learned about animals and habitats

Students picked up information about animals and their habits during the time they used the learning system. There were four sections in the tests that looked at the acquisition of knowledge about animals. Students did demonstrably better in three of the four.

- When asked to give an example of how people can help and hurt nature, most students gave short but not overly detailed answers. There was little difference in level of sophistication between pre-test and post-test. However, at the junior level, students may not have acquired sufficient expository skills for this type of question.
- One section consisted of seven multiple-choice questions, based on material discussed in the programs and print material. Students substantially improved their total score in the post-test.

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[1] See Robert E. Yager and Stuart O. Yager, "Changes in Perceptions of Science for Third, Seventh, and Eleventh-Grade Students," *Journal of Research in Science Teaching*, vol. 22, no. 4, April 1985, pp. 347-358.

- In the other two knowledge acquisition sections, students were asked to name animals that lived in the desert, and animals that lived in the rain forest. Student scores in the post-test showed a substantial improvement over pre-test results. There was also an extraordinary range of answers — students may have picked up information about animals even if they could not correctly locate the habitat of those animals.

Students appear to have gained knowledge of a more "concrete" nature. Since, for the most part, the capacity for abstract analysis is undeveloped at the junior level, this is to be expected.[1]

Student Attitudes to the Learning System

Students were attracted by new information on animals

Participating students liked *Habitat*. In the post-test, a quarter of the sample said that they liked *Habitat* more than anything else in their science class. They especially liked the characteristics and habits of animals presented in the programs. Students seem to have been stimulated by the variety and amount of new information on animals — information that, as noted above, was recalled in the post-test knowledge questions.

Most numerous complaints were about the number of notes taken in student activities

There was no one problem that stood out. The most frequent complaint was about the number of notes that had to be taken during and after the programs. At the junior level, many students have just started doing homework and assignments; they may not yet be comfortable with the quantity of work involved. Students also complained about the fast pace and/or short length of the program segments — they would just be getting comfortable with a segment and it would end; or, they would be momentarily distracted and the program would have changed to another, quite different, segment. This is probably a result of the large number of short segments in the program.

Just as teachers had criticized the legend segments, so had some students. Several in the focus groups noted that such segments were different in format from the rest of the program; and students found the exaggeration of some legends beyond what they considered credible.

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[1] A few important provisos should be noted here. First, we cannot say that *Habitat* increased students' knowledge; we can only say that the null hypothesis -- there was no increase in students' knowledge -- is disproved. Second, the lack of proper controls makes a valid comparison of variables impossible. It is certainly *possible* that using *Habitat* increased students' knowledge.

SUGGESTIONS AND RECOMMENDATIONS

Based on report findings, the following are proposed.

The Learning System As a Whole

1. The *Habitat* learning system appears to have been well received. Teachers and students appreciated the quality of the program`s photography, and the information about animals. They found the teacher's guide and magazine quite useful. Students learned at least some specific information about animals and habitats.

2. The students already had very favorable attitudes to science and scientists; the programs could not increase this. However, their perception of scientists broadened.

   It may be useful to ascertain if attitudes to science change as children grow older — for example, if Ontario students become more negative about science as they get older.

The Programs

3. Teachers thought that in using television in the classroom, the thematic approach was most effective. However, teachers had problems using a thematic teaching style with *Habitat*. Segments on one theme would be located in several videotapes; teachers thought the amount of setup and search time, and the problems of VCR technology, were very serious obstacles to effective use.

   Future learning systems should be designed to facilitate classroom use with a minimum of setup. If a thematic approach is emphasized, these themes should be put together in one program, or at least in such a manner that the teacher does not have to devote much of his/her time to operating the VCR.[1]

4. Teachers appear to have appreciated the longer (three-four-minute) segments of the programs, and had problems with the shorter minute-long segments. Some teachers and students commented that, on the whole, they would have liked longer sections. On the other hand, previous research has demonstrated that viewings longer than 15 minutes' continuous duration can be too demanding for students. Producers of future programs for school use might wish to construct segments between these two parameters — between 4 and 15 minutes.

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[1]The type of organization found in the *Habitat* learning system may be more applicable with technologies that are more efficient at searching and locating discrete segments. Computerized videodisks could be one such example.

5. Some students and teachers had problems with the legend segments in the programs. There were two major differences between the legend segments and other program parts: they used story board animation, and they talked about myths and tales, while the rest of the program was factual. This second difference appears to have been the major problem: students sometimes had difficulty making the transition from fact to fiction.

The Print Material

6. The primary purpose of print material should be as a video aid — to facilitate the use of video in the classroom. The teacher, *with minimal effort*, should be able to get an idea of content and learning objectives for each program, and can find what exercises and activities suit each program. Short exercises and activities that can be easily used in the classroom, and can be easily modified, appear to be especially successful. *The Habitat print material had these, and was highly regarded by teachers as a result.*

Considerations for Future Research

7. In this evaluation, all participants received copies of the print material as well as copies of the videotapes. This may not actually occur in the schools, however. There is, at present, no way to ensure that programs are used with print material. Tapes are ordered through a procedure independent of that through which print material is ordered; and each board has its own duplication and distribution system.

   It would be very useful to examine the distribution procedure to see what print materials are actually being used in the schools. Decisions to change or modify the learning system should be based on such market information.

8. It is interesting that many of the problems noted in the field test had already been "flagged" in focus group discussion with teachers. The most important criticism of the learning system — problems in using the VCR to locate program segments — is one that would easily have been noticed in a formative evaluation.

   This shows the importance of communicating with teachers before and during the development of learning systems used in the classroom. Such communication can take several forms — a formative evaluation, a discipline committee, or consultation with working teachers.